

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
28 February 2002 (28.02.2002)

PCT

(10) International Publication Number
WO 02/16843 A1

(51) International Patent Classification⁷: F25D 11/02, 17/06

Suryaprakash [IN/IN]; 1-15, Rallabavi Street, P.O. & Taluk Sircilla, Dist. Karimnagar 505 301, Andhra Pradesh (IN). MURTHY, Ramgopal [IN/IN]; 27-18-90 Congress Office Road, Vijayawada 520 002, Andhra Pradesh (IN).

(21) International Application Number: PCT/IN00/00076

(22) International Filing Date: 23 August 2000 (23.08.2000)

(74) Agents: DEPENNING, R., G. et al.; Depenning & Depenning, 31 South Bank Road, Chennai 600 028 (IN).

(25) Filing Language: English

(26) Publication Language: English

(71) Applicant (for all designated States except US): BPL REFRIGERATION LIMITED [IN/IN]; 1D, Kadugodi Sadaramangala Industrial Area, Whitefield Road, Whitefield, Bangalore 560 066 (IN).

(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

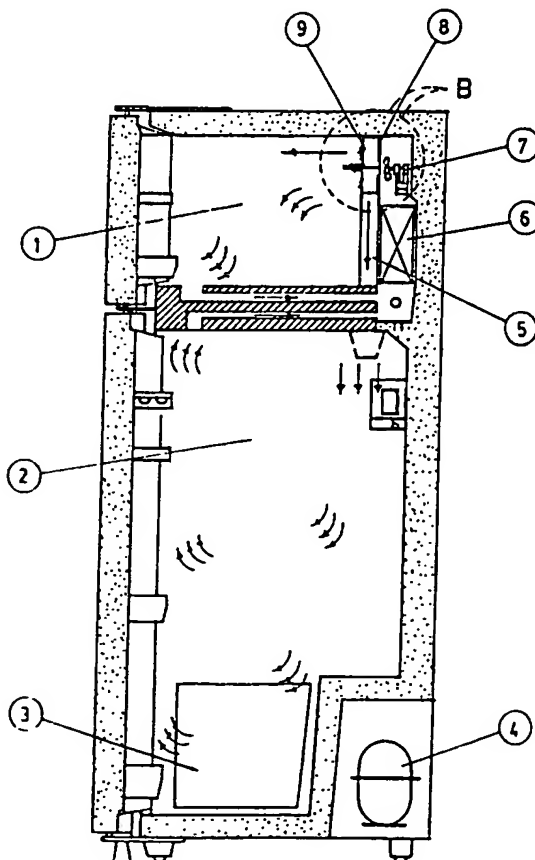
(72) Inventors; and

(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European

(75) Inventors/Applicants (for US only): CHITTAMPALLI,

[Continued on next page]

(54) Title: FROST FREE REFRIGERATOR HAVING MEANS TO CONVERT THE FREEZER COMPARTMENT ALSO TO FRESH FOOD COMPARTMENT



(57) Abstract: A frost free refrigerator having provision for converting freezer compartment also to fresh food compartment is provided. The refrigerator comprises a freezer compartment (1), a fresh food compartment (2) having a vegetable crisper, a compressor (4), an evaporator (6), and a fan (7) for providing cool air flow into the refrigerator compartments. A control means is provided for controlling the quantity of cold air flow to the freezer compartment (1) and fresh food compartment (2).

WO 02/16843 A1

BEST AVAILABLE COPY



patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Published:

— *with international search report*

FROST FREE REFRIGERATOR HAVING MEANS TO CONVERT THE
FREEZER COMPARTMENT ALSO TO FRESH FOOD COMPARTMENT

Technical field

The invention relates to a frost free refrigerator having means to convert the freezer compartment also to fresh food compartment.

Background of the invention

A conventional domestic frost free refrigerator comprises a freezer compartment and a fresh food compartment. The two compartments are separated by a thick wall of insulation. The different temperatures required in these compartments are attained and maintained by controlling the cold air flow into these compartments. The freezer temperature is maintained well below the fresh food compartment by allowing more cold air flow into the freezer compartment. A thermostat maintains the required temperature by controlling the compressor run time and/or by controlling the air flow. In general the frost free refrigerator has a bigger freezer

compartment compared with the direct cooling type refrigerator due to its inherent constructional features.

If the frozen food usage is less and seasonal and the refrigerator is mainly used for keeping fresh food at temperatures above 0°C, it may be advantageous to provide a mechanism to convert the freezer compartment also to fresh food compartment to increase the fresh food storage capacity.

Disclosure of the invention

The invention provides a frost free refrigerator having provision for converting freezer compartment also to fresh food compartment, said refrigerator comprising : a freezer compartment ; a fresh food compartment having a vegetable crisper ; a compressor ; an evaporater ; and a fan for providing cool air flow into the refrigerator compartments characterised by a control means for controlling the quantity of cold air flow to the freezer compartment and fresh food compartment.

Brief description of the drawings :

The invention will now be described in detail with reference to the accompanying drawings :

Fig. 1 shows the sectional view of a conventional domestic frost free refrigerator

Fig. 2 shows the enlarged view of the portion indicated by 'A' in Fig. 1

Fig. 3 shows the sectional view of a domestic frost free refrigerator according to the invention

Fig. 4 shows the enlarged view of the portion indicated by 'B' in Fig. 3.

Best mode for carrying out the invention :

The conventional frost free refrigerator comprises a freezer compartment (1), fresh food compartment (2) having a vegetable crisper (3) and a compressor unit (4). An

evaporater (6) and a fan (7) provides cool air to the refrigerator compartments through an insulation freezer partition (8) and a freezer partition (9). The temperature of the respective refrigerator compartments are maintained at the desired levels by means of a thermostat. The cold air supply portion is indicated with letter 'A' in Fig. 1 and an enlarged view of this portion is shown in Fig. 2. Air flow to fresh food compartment between the insulation freezer partition (8) and the freezer partition (9) is indicated by reference numeral 5 in Fig's 1 and 3.

The frost free refrigerator according to the invention is shown in Fig. 3 which has all the abovementioned features of the conventional frost free refrigerator and they are indicated by the same reference numerals. In addition, as shown in Fig's 3 and 4, it is provided with a control means for controlling the proportion of the air flow to the freezer compartment (1) and fresh food compartment (2). This control means comprises an inner baffle (11) supported by the freezer partition (9). The inner baffle (11) is movable with respect to an outer baffle (10) fixed to the insulation freezer partition (8). The inner baffle (11) is

provided with a knob (12) to enable it to move relative to the outer baffle (10). By doing so, the ratio of the quantity of air flow into the freezer compartment (1) to that into the fresh food compartment (2) can be varied. Thus both the freezer compartment (1) and the fresh food compartment can be maintained more or less at the same temperature by means of the knob (12). Preferably the inner baffle (11) is provided concentric with the outer baffle (10) to enable control of the quantity of air flow to each said compartments by turning the knob (12).

The frost free refrigerator according to the invention can be used in a normal mode with freezer compartment having temperature below 0°C and with freezer compartment having nearly same temperature as that of the fresh food compartment as the user desires.

CLAIMS :

1. A frost free refrigerator having provision for converting freezer compartment also to fresh food compartment, said refrigerator comprising : a freezer compartment (1) ; a fresh food compartment (2) having a vegetable crisper (3) ; a compressor (4) ; an evaporater (6) ; and a fan (7) for providing cool air flow into the refrigerator compartments characterised by a control means for controlling the quantity of cold air flow (5) to the freezer compartment (1) and fresh food compartment (2).

2. A frost free refrigerator as claimed in Claim 1, wherein the said control means comprises an insulation-freezer partition (8) providing air passages to the refrigerator compartments and separates cold air having the fan (7) and return air passing through the evaporater (6) ; a freezer partition (9) having air passages through which the cold air is supplied to the freezer compartment (1) and the fresh food compartment (2) ; an outer buffle (10) fixed to the insulation-freezer partition (8) and an inner buffle (11) supported by the freezer partition (9) and capable of

moving with respect to the outer baffle (10) for controlling the air flow into the freezer compartment (1) and fresh food compartment (2).

3. A frost free refrigerator as claimed in Claim 2, wherein the inner baffle (11) is provided concentrically with the outer baffle (10) and supported by the freezer partition (9) with a knob (12) enabling control of air flow into the freezer compartment (1) and fresh food compartment (2) by turning the knob (12).

4. A frost free refrigerator having means to convert the freezer compartment also to fresh food compartment substantially as hereinabove described with reference to the accompanying drawings.

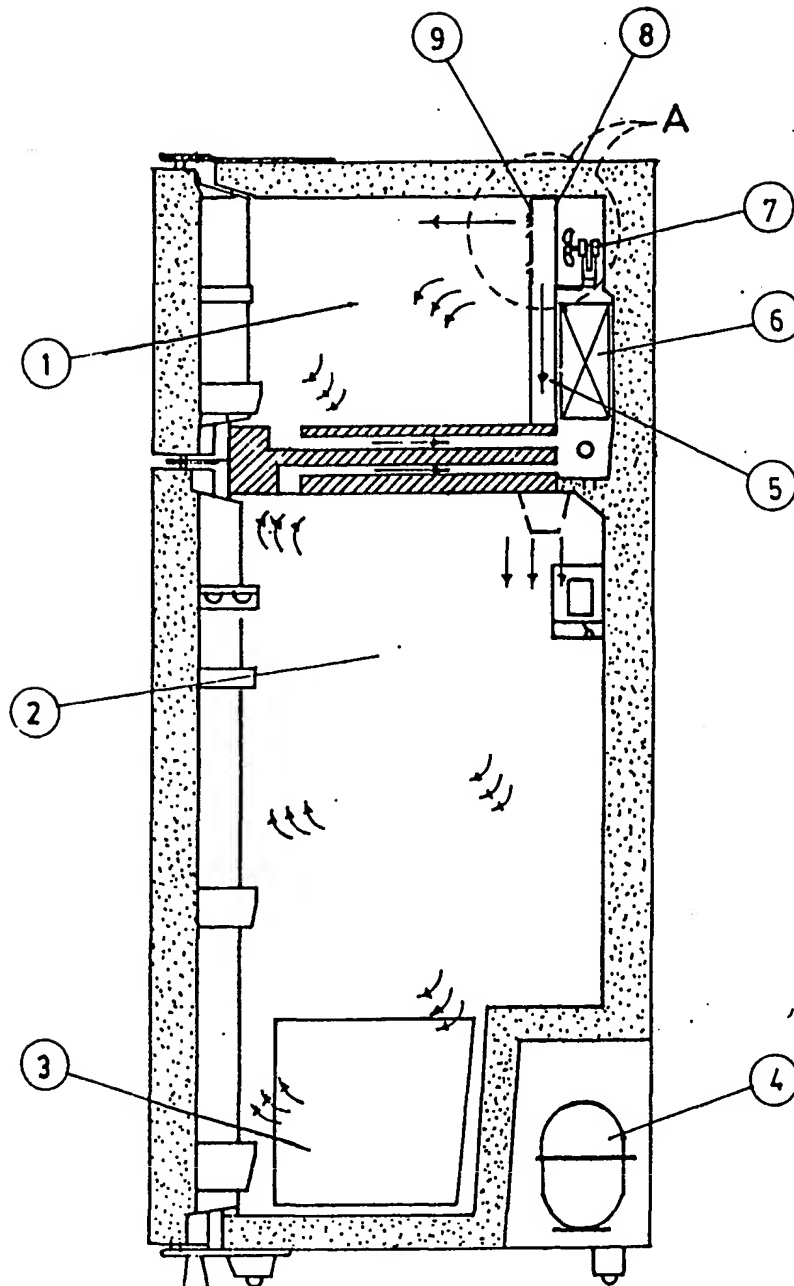


FIG. - 1

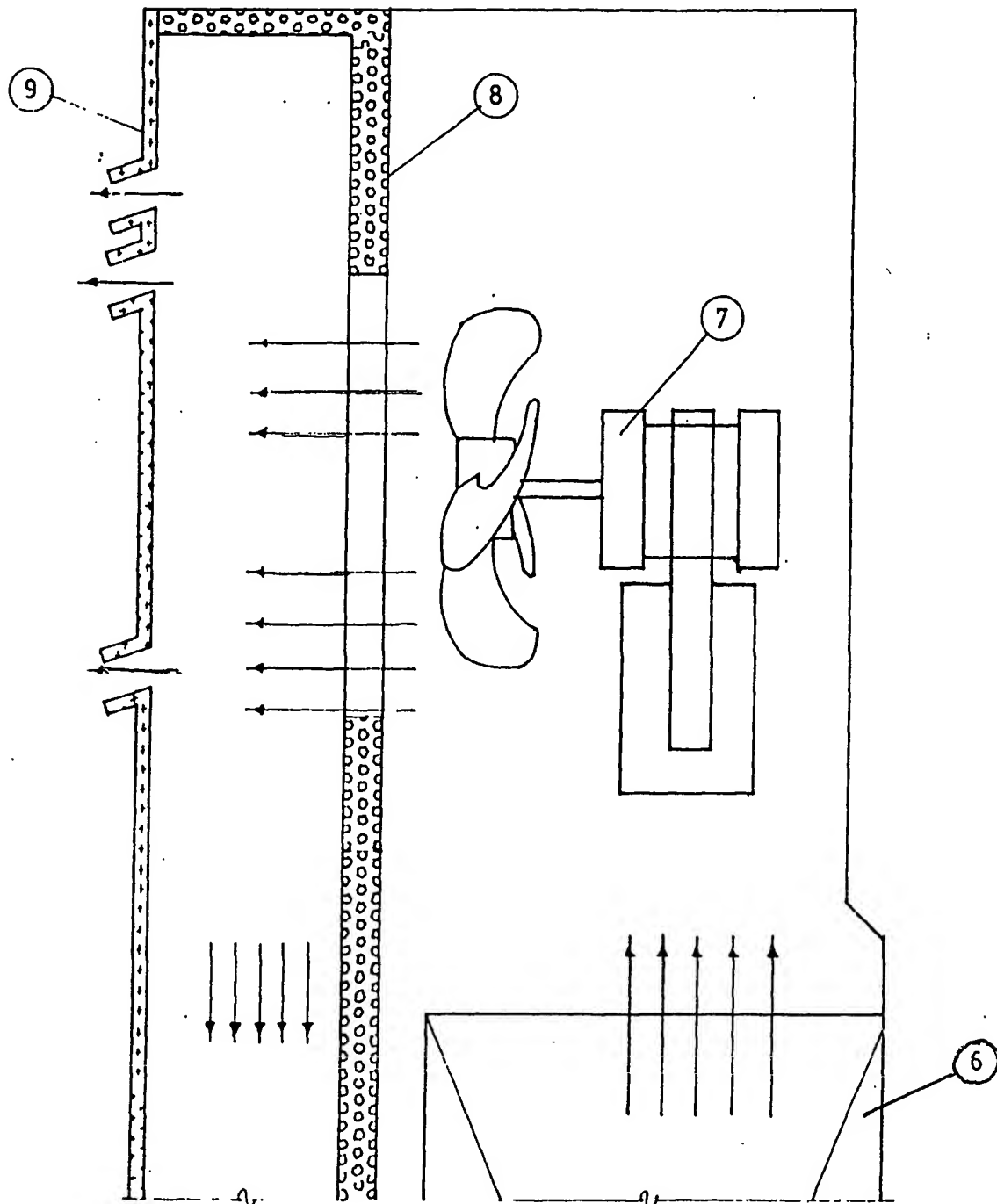


FIG - 2

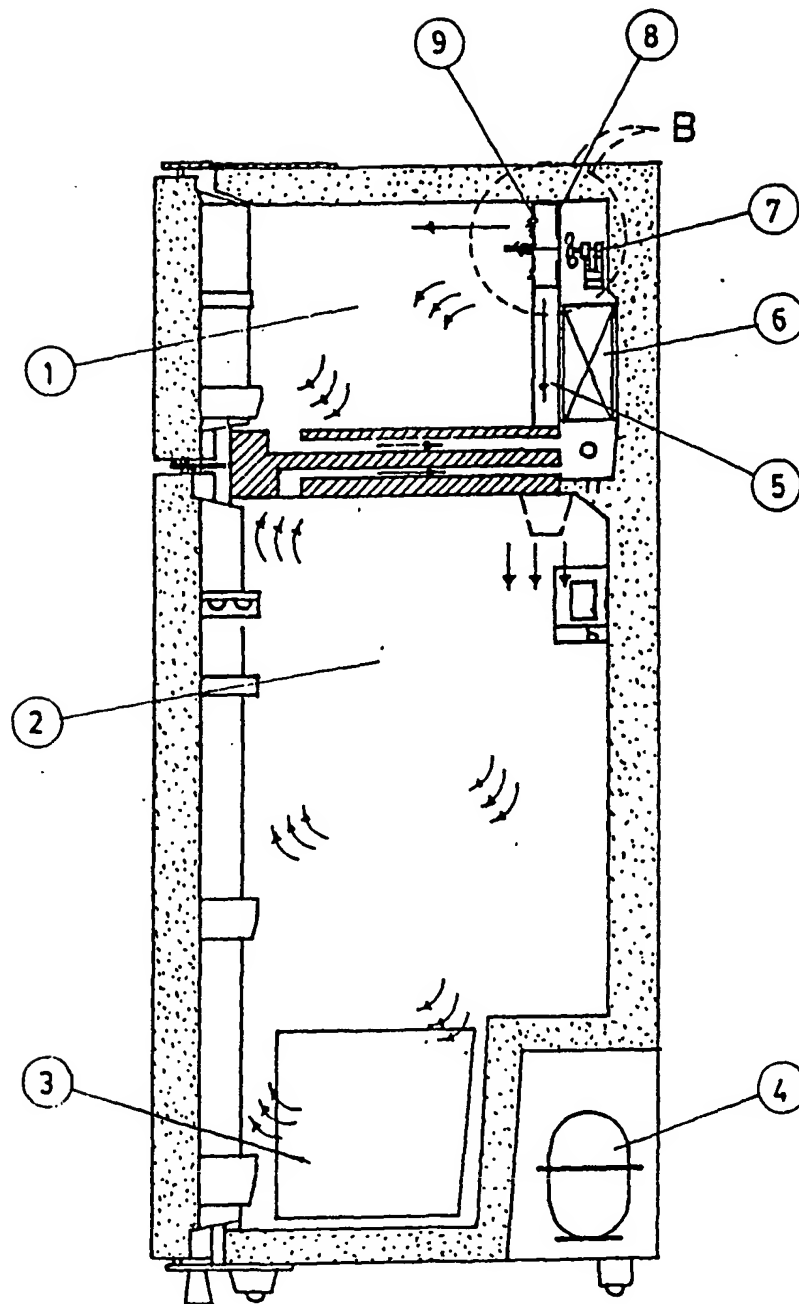


FIG - 3

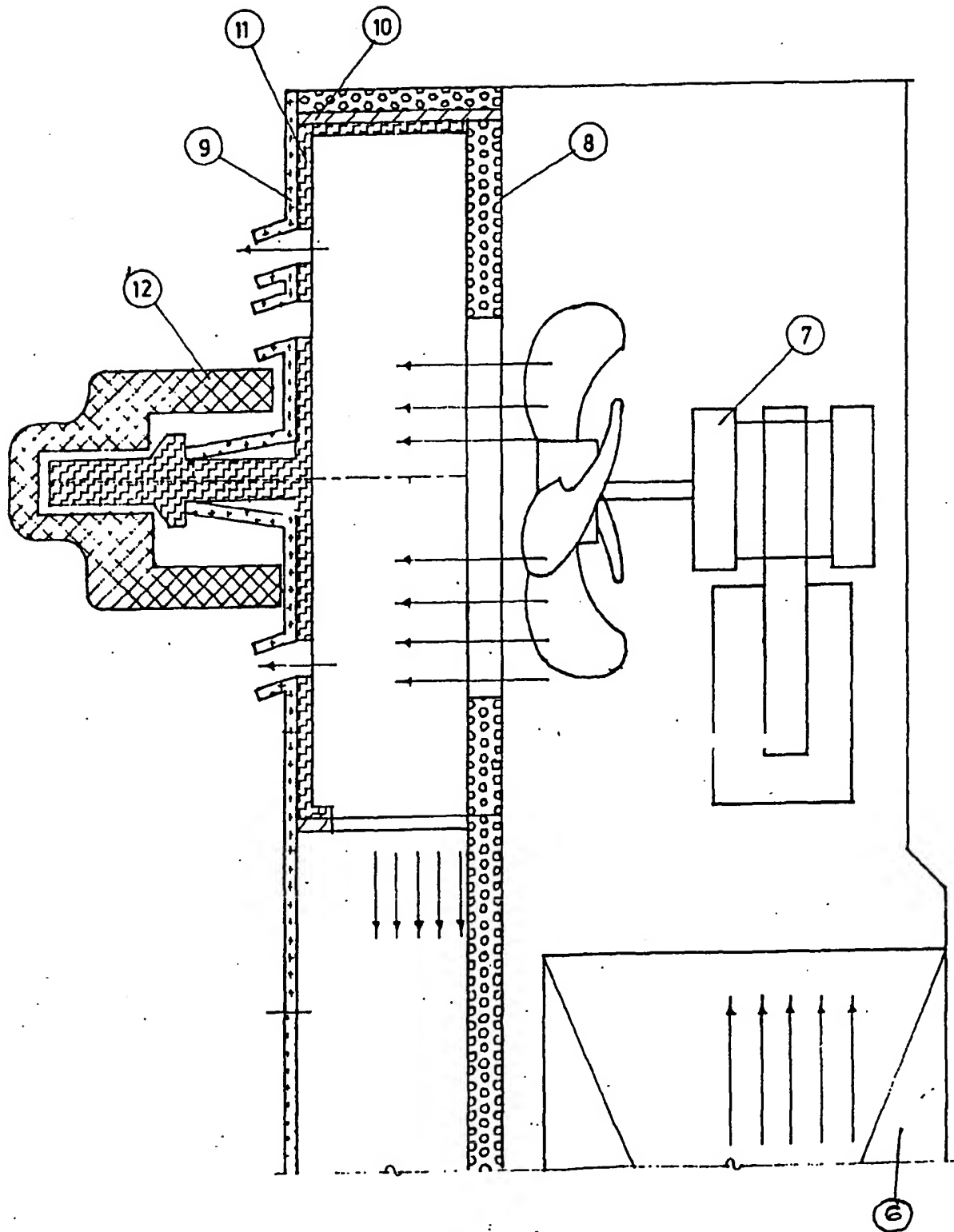


FIG - 4

INTERNATIONAL SEARCH REPORT .

International application No.
PCT/IN 00/00076

CLASSIFICATION OF SUBJECT MATTER

IPC⁷: F25D 11/02 ; F25D 17/06

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC⁷: F25D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

wpi,epodoc

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4614092 A (Kim) 30 September 1986 (30.09.86) <i>the whole document.</i>	1
A		2,3
X	EP 0553426 A1 (Whirlpool) 4 August 1993 (04.08.93) <i>page 2; fig.2.</i>	1
X	US 4642998 A (Kang) 17 February 1987 (17.02.87) <i>the whole document.</i>	1
A		2
A	EP 0541172 A2 (Candy) 12 May 1993 (12.05.93) <i>abstract; fig.1.</i>	1,2

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

„A“ document defining the general state of the art which is not considered to be of particular relevance

„E“ earlier application or patent but published on or after the international filing date

„L“ document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

„O“ document referring to an oral disclosure, use, exhibition or other means

„P“ document published prior to the international filing date but later than the priority date claimed

„T“ later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

„X“ document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

„Y“ document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

„&“ document member of the same patent family

Date of the actual completion of the international search

9 May 2001 (09.05.2001)

Date of mailing of the international search report

7 June 2001 (07.06.2001)

Name and mailing address of the ISA/AT

Austrian Patent Office

Kohlmarkt 8-10; A-1014 Vienna

Facsimile No. 1/53424/535

Authorized officer

WITTMANN

Telephone No. 1/53424/380

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IN 99/00076**Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)**

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☒ Claims Nos.: 4
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
this claim does not express any technical features of the invention
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT 00/00076

Patent document cited in search report			Publication date	Patent family member(s)	Publication date
EP	A2	541172	12-05-1993	DE C0 69211813	01-08-1996
EP	A3	541172	19-05-1993	DE T2 69211813	07-11-1996
EP	B1	541172	26-06-1996	IT A0 912985	08-11-1991
				IT A 1251989	27-05-1995
EP	A1	553426	04-08-1993	IT A0 920148	28-01-1992
				IT A 1260457	09-04-1996
US	A	4614092	30-09-1986	DE A1 3324623	12-01-1984
US	A	4614092	30-09-1986	DE C2 3324623	04-06-1987
				IT A0 8321993	08-07-1983
				IT A 1194579	22-09-1988
				KR Y1 8401553	20-08-1984
				KR Y1 8401554	20-08-1984
US	A	4642998	17-02-1987	none	

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ **BLACK BORDERS**
- ☒ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☐ **FADED TEXT OR DRAWING**
- ☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☐ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER:** _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.